Detection of Power Theft Using Zigbee Technology

Prof. N. S. Labhade[1], Sunil Pawale[2], Gajanan Barure[3], Ananta Valekar[4]
[1, 2, 3, 4] Department of Electronics and Telecommunication
[1, 2, 3, 4] Imperial College of Engineering, Wagholi.

Abstract- *Science and technology with all its miraculous advancements has fascinated human life to a great extent that imagining a world without these innovations is hardly possible. While technology is on the raising slope, we should also note the increasing immoral activities. With a technical view, "Power Theft" is a non-ignorable crime that is highly prevalent, and at the same time it directly affects the economy of a nation. Detecting and eradicating such crimes with the assistance of the developing scientific field is the "Need of the Hour". With these views was this paper conceived and designed. Our paper provides a complete and comprehensive tool to prevent power theft which is very simple to understand and easy to implement. It includes three sections - transmitting, receiving, and processing sections. The main objective of this project is to indicate electric power theft to electricity board. It is carried over through embedded technology. Here wireless method is used to find out the electric theft.*

Keywords- GSM, ZIGBEE, CT Coil.

I. INTRODUCTION

Electricity Theft is a very common problem in countries like India, where population is very high and the users of electricity are ultimately tremendous. In India, every year there is a very increasing no of electricity thefts across domestic electricity connections as well as industrial electricity supply, which results in loss of electricity companies energy and because of which we are facing the frequent problems of load shading in urban as well as rural area so as to overcome the need of electricity for whole state. Also the ways using which theft can be done are also innumerable so we can never keep track of how a theft has occurred, and this issue is needed to be solved as early as possible.

In this abstract, we propose an electricity theft detection system to detect the theft which is made by the most common way of doing the theft and that is bypassing the meter using a piece of wire, people simply bypasses the electricity meter whichis counting the current units by placing a wire before and after the meter reading unit. The proposed system will be hidden in such meters and as soon as an attempt is made for the theft, it will send an SMS to control unit of electricity board.

With existing theft detection system it is not possible to identify the exact location of bypassed point. So with the help of our proposed system it is possible to find exact location of bypassed point. This can be one of the advantages for easy detection on theft of electricity with its proper location

II. LITERATURE SURVEY

In the paper [1], Virendra pandey et. al. Said that wireless electricity theft detection system using Zigbee technology present an efficient and less costly way to adulterate the wireless technique used in this research paper. This wireless system is used to overcome the Theft of electricity via bypassing the energy meter and hence it also controls the revenue losses and utility of the electricity authorized agency.

In the paper [2], P.Kadurek et. al. Provide insight into the illegal use or abstraction of electricity in the Netherlands. The importance and the economic aspects of theft detection are presented and the current practices and experiences are discussed. The paper also proposes a novel methodology for automated detection of illegal utilization of electricity in the future distribution networks equipped with smart metering infrastructure. The necessary data requirements for smart meters and distribution substations are defined, in order to unlock this feature in distribution network. In the paper[3], Sagar patil et. al. Described that tapping. In the recent past, several techniques were proposed for detecting the location of direct tapping on a feeder and identifying illegal consumers. On a parallel track, some non-technical measures, such as inspection of customers with suspicious load profiles and campaigning against illegal consumption, were also implemented to control electricity theft. Some of the techniques (proposed worldwide) are described in this section. Electrical power theft detection system is used to detect an unauthorized tapping on distribution lines. Implementation area of this system is a distribution network of electrical power supply system. Existing system is notable to identify the exact location of tapping. This system actually finds out on which electrical line there is a tapping. This is a real time system. Wireless data transmission and receiving technique is used. This will protect distribution network from power theft done by tapping.

III. BLOCK DIAGRAM OF THE SYSTEM

Block Diagram of Transformer Section

CT coil:

A current transformer is defined as "as an instrument transformer in which the secondary current is substantially proportional to the primary current (under normal conditions of operation) and differs in phase from it by an angle which is approximately zero for an appropriate direction of the connections .Current transformers are usually either "measuring" or "protective" types. We have used two CT coil units. Here energy is provided by transformer and its current is measured at CT coil unit 1.

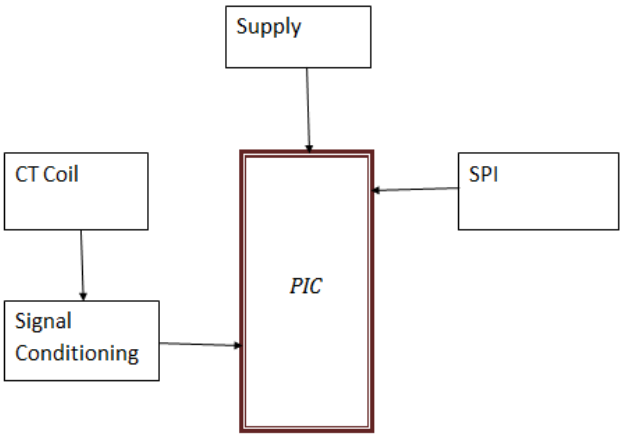


Fig : Block Diagram of Transformer Section

Unit 2 is used to measure current at receiving end that measurements are communicated through controller to home station by SPI protocol.This unit measure current, voltage and calculate power and transmit by SPI protocol.

SPI Protocol:

Serial Peripheral Interface (SPI) is an interface bus commonly used to send data between microcontrollers and small peripherals such as shift registers, sensors, and SD cards. It uses separate clock and data lines, along with a select line to choose the device you wish to talk to.

Block Diagram of Home Meter Section

CT coil:

A current transformer is defined as "as an instrument transformer in which the secondary current is substantially proportional to the primary current (under normal conditions of operation) and differs in phase from it by an angle which is approximately zero for an appropriate direction of the connections."

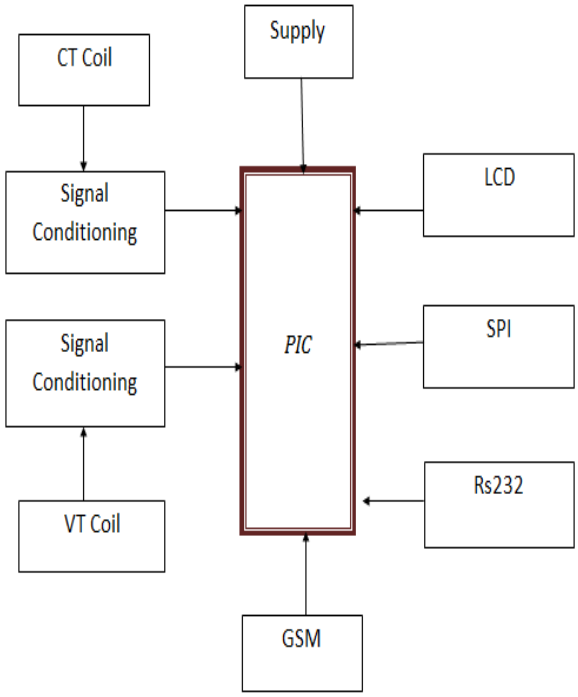


Fig:- Block Diagram of Home Meter

Current transformers are usually either "measuring" or "protective" types. Here in our home unit there are using two CT coil current measurements. We are going to check the difference between power delivered and power received. If it is significantly differing from the delivered power and distributed power then it means there is somewhere power theft loss is going on.

RS232:

Serial communication – RS232, a popular way to transfer commands and data between a personal computer and a microcontroller is the use of standard interface, like the one described by protocols RS232 .

LCD:

The 16*2 alphanumeric display to display measured parameters. We are going to measure current, voltage, power. And also theft message would be shown. When this unit receives parameters, it compares with the parameters calculated at home station unit.

Block Diagram of Theft Detection (mobile) Unit

This is the portable unit which is used to locate theft point. We are going to measure parameters along service line

and determine the points on the line between which there is large difference of power measurement is observed

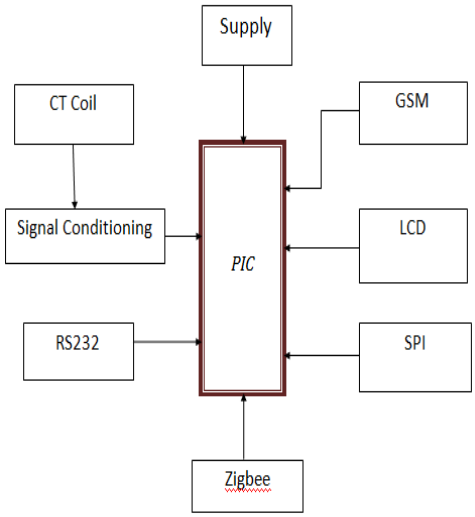


Figure: Block Diagram of Theft detection (mobile) unit

IV. SOFTWARE DEVELOPMENT

Proteus 8 is a single application with many service modules offering different functionality (schematic capture, PCB layout, etc.). The wrapper that enables all of the various tools to communicate with each other consists of three main parts.

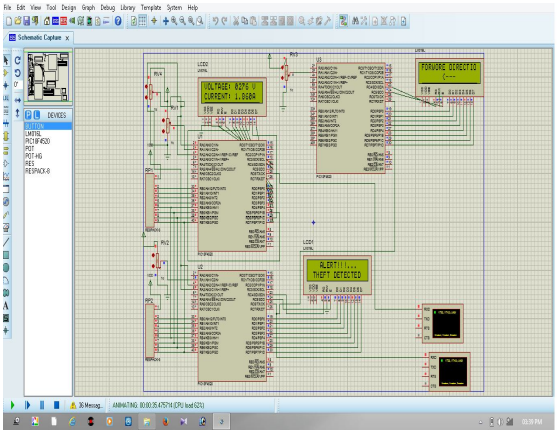
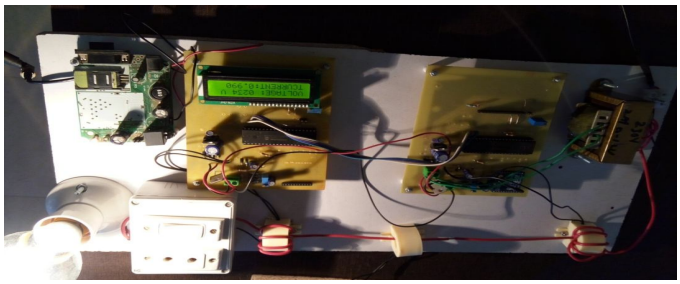


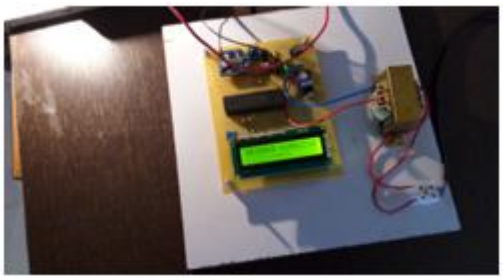
Figure: Simulation Result

V. RESULTS

Gives power supply of 230v AC for V=230 and I=1A.Then compare transformer meter and home meter display reading on LCD .If there is no difference then there is no theft otherwise theft detect.

For detection of theft we bypassing home meter then there is difference between home meter and transformer section then theft detect on home meter then this msg send to registered mobile no by using GSM. also we find out approximate location of theft point by using ct coil





VI. ACKNOWLEDGEMENT

It is a great pleasure for us to present a project “Detection of Power Theft Using Zigbee Technology” where guidance plays an invaluable key and provides concrete platform for completion of the project.

The hard work and perseverance of our mentor will always be embedded in our memory. Project execution would not have been possible for us without the continued assistance of certain people. We take this opportunity to express our deepest gratitude for all the heartfelt assistance rendered.

We thank Prof. N. S. Labhde my project guide who was responsible for coordinating all efforts and sincerely grateful to her for helping to achieve high standards of performance.

We are very grateful to Prof. P. R. Badadapure HOD of ICOER, Wagholi for making available all the facilities required for the successful completion of the project.

VII. CONCLUSION

In developing countries electricity theft is a common practice especially in remote areas, as they do not pay utility bills to a government company in case of electricity and gas as well. To solve these problem governments must think of an idea to provide help in terms of subsidy to manage this issue. With this system the service provider can collect the bill any

time with a single message. The data collection and manipulation task becomes fast and easier. Any modification can be made to the code in less time. Changes in rate or unit calculation can be done very effectively. This technique is more efficient than other technique for saving the electricity.

REFERENCES

[1] "Wireless Electricity Theft Detection System Using Zigbee Technology" Virendra Pandey1, Simrat Singh Gill2, Amit Sharma3 1(EC, final year), 2(Assistant Professor), 3 (Assistant Professor) MIT, MORADABAD.

[2] "Theft detection and smart metering practices and expectations in the Netherlands" P.Kadurek, Student member, IEEE, J. Blom, J. F. G. Cobben, W. L. Kling, Member, IEEE1

[3] "Electrical Power Theft Detection and Wireless Meter Reading" presented by Sagar Patil, Gopal Pawaskar, Kirtikumar Patil"

[4] Amin S. Mehmood, T. Choudhry, M.A. Hanif, "A Reviewing the Technical Issues for the Effective Construction of Automatic MeterReading System" in International Conference on Microelectronics, 2005 IEEE.

[5] Abdollahi, A. Dehghani, M. Zamanzadeh, "SMS-based Reconfigurable Automatic Meter Reading System" in Control Applications, 2007.

[6] Bharath, P.; Ananth, N.; Vijetha, S.; Prakash, K.V.J.; "Wireless Automated Digital Energy Meter" in Sustainable Energy Technologies, ICSET 2008.

[7] HE Xiao-rong, DONG Ch UN, LIU Shu-xi. The new Technology and application of singlephase electric Energy meter defense electricitystealing. Power Supply, 2007, Vol.24, No.2: pp.70-71, 74.

[8] Uros Bizjak, Drago Strle. IEC class 0.5 electronic Watt-hour meter implemented with first-order sigma delta converters. International Journal of Electronics and Communications, 2005, Vol.59: pp.447-453.